

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

**WASTE UTILIZATION
(acre)
Code 633**

DEFINITION

Using agricultural wastes such as manure and wastewater or other organic residues.

PURPOSES

1. Protect water quality
2. Provide fertility for crop, forage, fiber production
3. To provide nutrients for the production of forest products
4. Improve or maintain soil structure
5. Provide feedstock for livestock
6. Provide a source of energy

CONDITION WHERE THE PRACTICE APPLIES

This practice applies where agricultural wastes including animal manure and contaminated water from livestock and poultry operations; solids and wastewater from municipal treatment plants; and agricultural processing residues are generated, and/or utilized. When the term **waste** is used throughout this standard it refers to agricultural wastes including animal manure and contaminated water from livestock and poultry operations; solids and wastewater from municipal treatment plants; and agricultural processing residues.

CRITERIA

Criteria Applicable to All Purposes:

1. All federal, state and local laws, rules and regulations governing waste management, pollution abatement, health and safety are to be strictly adhered to (See Section I, eFOTG). The owner or operator is responsible for securing any and all required permits or approvals related to waste utilization, and for operating and maintaining any components in accordance with applicable laws and regulations.
2. The use of agricultural wastes (manure and wastewater) is to be based on at least one annual analysis of the material in storage. When wastes are stored/managed in different structures a minimum of one analysis is needed from each structure annually. As a minimum, the waste analysis is to identify Total N, Ammonium N, Organic N, P₂O₅, K₂O, and percent solids. NOTE: The initial nutrient content of manure and planned application rates from newly constructed or revised systems may be based on similar operations or accepted "book values" from the Midwest Plans Service (MWPS) 18, Section I, 2000, or OSU Bulletin 604, or an approved NRCS Manure/Nutrient Management Software Program. Municipal and domestic wastewater, sludge, and septage are to be analyzed per the Ohio Environmental Protection Agency (OEPA) or other appropriate regulating agency's rules and regulations.

3. All land to have wastes applied is to be soil tested to determine pH, CEC, P, and K as a minimum prior to plan development and land application. Soil tests are to be taken per the Nutrient Management Standard (590).
4. Where agricultural wastes are to be spread on land not owned or controlled by the producer, the waste management plan, as a minimum, shall document the amount of waste to be transferred and who will be responsible for the environmentally acceptable use of the waste.
5. Records of the use of wastes are to be kept a minimum of five (5) years as discussed in OPERATION AND MAINTENANCE section of this standard.
6. Persons who approve plans for Nutrient Management and Comprehensive Nutrient Management Plans are to be certified through NRCS – approved certification programs; or other approved NRCS programs within Ohio. Producer developed plans are to be approved by a certified individual.
7. Plans for manure, organic by-product, or biosolids utilization that are elements of a more comprehensive conservation plan, are to recognize other components of the conservation plan and be compatible with its other components.
8. Plans for manure, organic by-product, or biosolids utilization and nutrient management are to specify the form, source, amount, timing, and method of application of nutrients on each field to achieve realistic production goals while minimizing nitrogen and/or phosphorus movement to surface and/or ground water.
9. The Nutrient Management Plan (NMP) for Waste Utilization (Standard Code 633) is to incorporate the criteria for Nutrient Management (Standard Code 590), as well as other practices needed in the system. The content for the "NMP" is a part of the Nutrient Management Standard (590).
10. Application rates for wastes are to be based on the most limiting factor of nutrient content or volume/weight limitation of the material.
11. The application of sludge and sludge products under the jurisdiction of OEPA or septage under the jurisdiction of the Ohio Department of Health shall be applied to meet the rules and regulations of the appropriate agency and the criteria of this standard.

Additional Criteria to Protect Water Quality

1. All agricultural wastes are to be utilized in a manner that minimizes the opportunity for contamination of surface and ground water supplies.
2. Agricultural wastes are not to be land-applied on soils that are frequently flooded, as defined by the National Cooperative Soil Survey (or in the Flooding Frequency Soil List posted in Section II eFOTG), during the period when flooding is expected unless incorporated immediately.
3. For liquid wastes, the application rate is to be adjusted to the most limiting factor to avoid ponding, surface runoff, subsurface drainage (tile) discharge, the nutrient needs of the field, or the nitrogen or phosphorus risks for the field. The total application is not to exceed the field capacity of the upper 8 inches of soil. See **Table 1** of this standard (**Available Water Capacity (AWC) Practical Soil Moisture Interpretations for Various Soils Textures and Conditions to Determine Liquid Waste Volume Applications not to exceed AWC**) to determine AWC and the amount (volume) that can be applied to reach the AWC. The actual application rate shall be adjusted during application to avoid ponding or runoff. Bare/Crusted soils may require some tillage to improve infiltration. See **Table 4**, of this standard, (**Determining The Most Limiting Manure Application**

Rates) to determine the most limiting application rate factor base on the field condition and site limitations.

4. Fields or areas of fields that are subsurface (TILE) drained require additional precautions. When liquid wastes are applied to fields with subsurface (TILE) drains, the liquid can follow soil macropores directly to the tile drains creating a surface water pollution hazard from direct tile discharge. A field is considered subsurface (tile) drained if 1/3 or more of the field is subsurface (tiled) drained; however, even a field with one subsurface drainage line may present a risk of manure/wastewater movement to subsurface drains and cause a direct discharge.
 - a. Do not apply application rates (volume) that would exceed the lesser of the AWC in the upper 8 inches or 13,000 gallons/acre per application.
 - b. Prior to manure application, use a tool (AERWAY tool or similar tool) that can disrupt/close (using horizontal fracturing) the preferential flow paths (worm holes, cracks, root channels) in the soil, or till the surface of the soil 3-5 inches deep to a condition that will absorb the liquid wastes. The purpose is to have the surface soil act as a sponge to soak up the liquid manure and keep it out of preferential flow channels. This is especially important if shallow tile are present (< 2 feet deep). Any pre-application tillage should leave as much residue as possible on the soil surface. The adsorption of liquid manure by the soil in the root zone will minimize nitrogen loss and the manure/nutrient runoff potential. For perennial crops (hay or pasture), or continuous no till fields where tillage is not an option, all tile outlets from the application area are to be plugged prior to application. This criteria (4b.) may be waived if the producer can verify there is no prior history of manure discharge via subsurface drains. However, if there is a discharge the producer is liable for damages and may risk being classified as a CAFO.
 - c. If injection is used, inject only deep enough to cover the manure with soil. Till the soil at least 3 inches below the depth of injection prior to application, or all tile outlets from the application area are to be plugged prior to application. This criteria (4c.) may be waived if the producer can verify there is no prior history of manure discharge via subsurface drains. However, if there is a discharge the producer is liable for damages and may risk being classified as a CAFO.
 - d. In addition to tillage prior to surface liquid waste application or injection, install in-line tile flow control structures or inflatable tile plugs that can mechanically stop or regulate tile flow either prior to application, or have on site if needed to stop tile flow. Use caution not to back tile water where it may impair the functioning of an offsite subsurface drainage system. This criteria (4d.) may be waived if the producer can verify there is no prior history of manure discharge via subsurface drains. However, if there is a discharge the producer is liable for damages and may risk being classified as a CAFO.
 - e. Repair broken tile or blow holes prior to application.
5. Fields or areas of fields that have systematic "surface drainage" systems (e.g. shallow surface drains spaced 100 – 200 feet apart – NRCS Practice Code 607). These "internal" surface drains are considered concentrated flow areas. However, if special precautions are taken, manure can be applied in the surface drains with minimal risk of surface runoff. THIS DOES NOT APPLY TO THE COLLECTOR SURFACE DRAINS (mains) OR DRAINS BORDERING THE FIELDS. The following special manure application techniques shall be used:
 - a. Till the surface at least 3 to 5 inches deep prior to LIQUID manure surface application. For SOLID manure till either prior to application or incorporate within 24 hours. This can be done with a heavy disk, chisel plow, plow, field cultivator, AERWAY tool, or similar tool that can provide "full-width" soil disturbance to a depth of 3-5 inches.
 - b. Surface apply the LIQUID manure uniformly over the entire soil surface on the freshly tilled soil. The purpose of the surface application on the freshly tilled soil is to allow the liquid manure to be soaked/absorbed into the entire 3-5 inches of loose soil surface.

- c. For fields that have no subsurface drainage, the LIQUID manure can be injected directly with no prior tillage.
 - d. Limit LIQUID application rates to 13,000 gallons per acre or less per application.
6. The Nitrogen and Phosphorus Application Criteria for Manure, Organic By-Products, and Biosolids contained in the practice standard Nutrient Management 590 are to be followed to limit transport and leaching of N and P.
7. Application of wastes to frozen and snow covered soil. Application on frozen and snow covered soil is not recommended. However, if manure application becomes necessary on frozen or snow covered soils, only limited quantities of manure shall be applied to address waste storage limitations until non frozen soils are available for manure application. These situations need to be documented in the CNMP and in the producer records. If winter application becomes necessary, applications are to be applied only if ALL the following criteria are met:
- a. Application rate is limited to 10 wet tons/acre for solid manure more than 50% moisture and 5 wet tons for manure less than 50% moisture. For Liquid manure the application rate is limited to 5000 gallons/acre.
 - b. Applications are to be made on land with at least 90% surface residue cover (e.g. good quality hay or pasture field, all corn grain residue remaining after harvest, all wheat residue cover remaining after harvest).
 - c. Manure shall not be applied on more than 20 contiguous acres. Contiguous areas for application are to be separated by a break of at least 200 feet. Utilize those areas for manure application that are furthest from streams, ditches, waterways, surface water, etc (areas that present the least runoff potential and are furthest from surface water).
 - d. Increase the application setback distance to 200 feet "minimum" from all grassed waterways, surface drainage ditches, streams, surface inlets, water bodies. This distance may need to be further increased due to local conditions.
 - e. The rate of application shall not exceed the rates specified in Table 4 - Determining The Most Limiting Manure Application Rates for winter application.
 - f. Additional winter application criteria for fields with significant slopes more than 6% (fields exceeding 6% are to be identified in the CNMP). Manure shall be applied in alternating strips 60 to 200 feet wide generally on the contour, or in the case of contour strips on the alternating strips.
8. Wastes are not to be applied to cropland over 15% slope or to pastures/hayland over 20% slope unless one of the following precautions is taken:
- a. Immediate incorporation or injection with operations done on the contour, UNLESS the field has 80% ground cover (residue and/or canopy).
 - b. Applications are timed during periods of lower runoff and/or rainfall (Late May to Mid-October).
 - c. Apply low rates through split applications (separated by rainfall events). Apply no more than 10 wet tons/acre for solid manure/wastes; or 5000 gallons/acre for liquid manure/wastes.
 - d. The field is established and managed in contour strips with alternate strips in grass or legume.
9. No application of manure or organic by-products shall be made within a minimum distances shown below. These distances may need to be increased due to local conditions e.g. pond or lake used for a water supply or recreation area, or a stream that is already impaired by excess nutrients, etc. Setback distances from water and drainageways etc. is measured from the top of the edge of the bank at field level.

Minimum Setback Distances for the Application of Manure and other Organic By-Products ^{5/, 6/}

Type of Sensitive - Setback Area			
	Surface Application	Winter Application Frozen or Snow Covered Soils ^{7/}	Surface Incorporation W/1 24 Hours OR Direct Injection
Residences / Private Wells down slope from the application area.	100 ft.	200 ft.	100 ft.
- Sinkholes	300 ft.		100 ft.
- Pond or Lake	- 35ft. Vegetative Barrier ^{1/} , with the remaining 100 ft. setback in non-vegetative Setback ^{2/}	- 35ft. Vegetative Barrier ^{1/} , with the remaining 200 ft. setback in non-vegetative Setback ^{2/}	- 35ft. Vegetative Barrier ^{1/}
- Streams - Ditches - Surface Inlets	- 35ft. Vegetative Barrier ^{1/} , OR - 100 ft. setback in non-vegetative Setback, OR - 35 ft. in non-vegetative setback ^{3/}	200 ft.	None
Grassed Waterway	35 ft.	200 ft.	None
Field Surface Drains	35 ft. ^{4/}	200 ft.	None
Public Wells	300 ft.	300 ft.	100 ft.
Developed Springs	300 ft. upslope	300 ft. upslope	300 ft. upslope
Public Surface Drinking Water Intake	300 ft.	300 ft.	300 ft.

1/ Permanent vegetation consisting of grass, grass/legume mix, trees/shrubs, or trees/shrubs and grass/legumes. Measured from top of bank.

2/ Includes 100 ft. total setback. The setback must include a minimum of 35 ft. of vegetative cover from top of bank with the remainder of the 100 feet with no vegetative requirement. The setback is measured from the top of bank.

3/ Applies if the manure application area has at least 50% vegetation/residue cover at the time of application.

4/ No setback required for field surface drains if the **Additional Criteria to Protect Water Quality, Item 5** is applied from this standard.

5/ CAFO's must follow the setbacks defined in the Ohio Department of Agriculture (ODA) rules regarding manure application. See **Table 5 – ODA Setbacks - Appendix A Table 1 of rule 901:10-1-14: Land Application Restrictions and Setbacks**

6/ Excludes sludge that is regulated by the Ohio Environmental Protection Agency (OEPA) and septage regulated by the Ohio Department of Health.

7/ **See Additional Criteria to Protect Water Quality, Item 7, for the special manure application criteria on frozen and snow covered fields.**

10. The number of years to reach 150 ppm Bray P1 or equivalent shall be calculated if manure, organic by-products, or biosolids application rates exceed the Phosphorus crop removal rates. Use the procedure outlined in **Table 3 - Procedure to Determine Bray P1 or equivalent Soil Buildup** or other appropriate software that can determine Phosphorus buildup.

Additional Criteria for Providing Nutrients for Crop, Forage, Fiber Production and Forest Products

1. Where agricultural wastes are utilized to provide fertility for crop, forage, fiber production, and forest products, the practice standard Nutrient Management (590) shall be followed.
2. See **Table 2** - Application Rates on Idled Cropland with a Growing Cover, Set-Aside or Land in Government Programs for application rate criteria for these land uses.

Additional Criteria for Improving or Maintaining Soil Structure

Apply a minimum of 1-2 dry tons/acre/year of manure, organic by-products, or biosolids to supplement low biomass producing crops (soybeans, corn silage, canola, sunflowers, etc.) or enhance soil tilth after high biomass crops; but do not exceed the nutrient application criteria of the practice standard Nutrient Management (590).

Additional Criteria for Providing Feedstock for Livestock

Agricultural wastes to be used for feedstock shall be handled in a manner to minimize contamination and preserve its feed value. Chicken litter stored for this purpose shall be covered. A qualified animal nutritionist shall develop the rations that utilize these wastes.

Additional Criteria for Providing a Source of Energy

1. Use of agricultural waste for energy production shall be an integral part of the overall waste management system.
2. All energy producing components of the system shall be included in the waste management plan and provisions for utilization of residues for energy production shall be identified.
3. Where the residues of energy production are to be land-applied for crop nutrient use or soil conditioning, the criteria of this standard shall apply.

Considerations

1. The effect of Waste Utilization on the water budget should be considered, particularly where a shallow ground water table is present or in areas prone to runoff. Limit waste application to the volume of liquid that can be stored in the root zone.
2. Consider avoiding manure and other bio-solids application within 300 feet of a neighboring residence, business, or public recreation site, etc. for aesthetic purposes.
3. The pathogens and other pathogenic organisms may be contained in wastes and should be utilized in a manner that minimizes their exposure to animals and humans.
4. Priority areas for land application of wastes should be on gentle slopes located as far as possible from waterways. When wastes are applied on more sloping land or land adjacent to waterways, other conservation practices should be installed to reduce the potential for offsite transport of waste.
5. It is preferable to apply wastes on pastures and hayland soon after cutting or grazing before re-growth has occurred. Also, limit the application rate to avoid salt damage and/or coverage to the pasture and hayland.
6. Ways to minimize the impact of odors of land-applied wastes include:
 - a. Making application at times when temperatures are cool and when wind direction is away from neighbors.
 - b. If manure is spread on warm days, do so in the morning.

- c. On windy days, odors travel shorter distances before being mixed in the atmosphere to the point that odor is not detected.
 - d. Do not spread on calm, humid days unless the field is isolated.
 - e. Communicate with neighbors to plan applications that do not interfere with holidays or outdoor social functions.
 - f. Injection or immediate incorporation will minimize odors.
 - g. Special Criteria for Manure/Waste Irrigation to Minimize Odors:
 - (1) Use lower pressure nozzles (less than 80 psi) to reduce the aerosol effects of fine droplets.
 - (2) Use low trajectory nozzles to reduce drift..
 - (3) Use "Pulse Irrigation Technology" to improve infiltration.
 - (4) Use a minimum buffer zone where no irrigation will be done within 50 feet of roads and 300 feet from neighboring buildings and recreation areas when the wind is blowing away from these areas. If the wind is blowing in the direction of these areas the buffer should be much wider.
7. Reduce nitrogen volatilization losses associated with the land application of waste by incorporation within 24 hours. Volatilization losses may be limited by applying wastes when soil and air temperatures are less than 50 °F.
8. If injection is desired consider using straight points and spaced closer (< 30 inches, 10-15 inches would be better) to reduce the volume of liquid manure coming out of each knife point (or a disk type implement with a distribution manifold for even distribution across the swath). This helps to reduce the volume that can reach the preferential flow channels. If injection is used, it should only be deep enough to cover the manure with soil.
9. If fields have a history of liquid manure entering the subsurface drainage system the subsurface drainage outlets should be closed or plugged prior to application.
10. When fields are not suited for manure application due to weather, crop, or soil conditions field stock piling of manure may provide an option to move manure to fields for later application when the manure can be applied under more suitable and lower risk situations.
11. Minimize environmental impact of land-applied waste by limiting the quantity of waste applied to the rates determined using the practice standard Nutrient Management (590) for all waste utilization.
12. Agricultural and municipal wastes are valuable economic assets and can be used to replace all or part of the nutrients used by the crops.
13. Excess or improper applications of wastes can harm crops, soils, surface and ground water quality, waste nutrients, and create nuisances.
14. The proper utilization of wastes will minimize the potential for pollution of wells, groundwater, streams, or impoundment by seepage, leaching, runoff, or surface scouring during flooding.
15. Perform periodic inspections of tile systems to repair blow holes, broken tile, and inlets.
16. Try to avoid spreading on wet soils and limit axle loads to reduce the compaction of the soil.
17. The Ohio Livestock Waste Management Guide (OSU Bulletin 604 – 1992); the Ohio Irrigation Guide; and OSU AEX 704 and 705; and EPA CAFO Rules on waste application provide additional guidelines and procedures for land application of animal wastes.

18. Forage crops (grasses and legumes) are capable of using more nutrients than row crops (corn, soybeans, and wheat).
19. A planned grazing system can substantially reduce waste to be mechanically handled and spread to reduce cost and environmental hazards.
20. Evaluate the need for special application criteria for designated watersheds needing additional or priority treatment to address nutrient or pathogen impaired water quality.
21. Consider management to maintain clean roads during waste and equipment transport.
22. Avoid applying lime stabilized biosolids on soils with a pH > 7.5.

PLANS AND SPECIFICATIONS

Plans and specifications for Waste Utilization are to be in keeping with this standard and are to describe the requirements for applying this practice to achieve its intended purpose(s). The Nutrient Management Plan (which includes Waste Utilization) that is a component of the CNMP is to account for the utilization or other utilization of all animal waste produced and all waste application areas shall be clearly indicated on a plan map. The content and format for the Nutrient Management component of the CNMP is contained in the practice standard Nutrient Management (590). See the 633 and 590 Practice Documentation sheets found at the end of both standards that lists the minimum documentation needed for a nutrient management plan. The Purdue MMP software with its CNMP Document Maker Tool will generate a nutrient management plan with all the required components as well as all the components of the entire CNMP. The Missouri Spatial Nutrient Planner (SNMP) is useful to produce a map of the planned fields. Both software programs can be downloaded from www.agry.purdue.edu/mmp.

OPERATION AND MAINTENANCE

1. Records shall be kept for a period of five years or longer (metals analyses and associated application rates and locations are to be maintained permanently), and include when applicable:
 - a. Quantity of waste produced, and its appropriate analysis.
 - b. The last 3 soil test results.
 - c. Dates, analysis, and amounts of waste that is land applied.
 - d. The dates and amounts of waste removed from the system due to feeding, energy production, or export from the operation.
 - e. Waste application methods.
 - f. Crops grown and yields (both yield goals and measured yield).
 - g. Other tests, such as determining the nutrient content of the harvested product.
 - h. Calibration of application equipment (Refer to Ohio State University Fact Sheet AEX-707).
 - i. A record of the soil moisture conditions and weather conditions (temperature and wind direction) at the time of application.
 - j. Monitor fields during and after application for runoff or subsurface drainage discharge.
2. The operation and maintenance plan is to include the dates of periodic inspections and maintenance of equipment and facilities used in waste utilization. The plan should include what is to be inspected or maintained, and a general time frame for making necessary repairs.

References:

1. USDA-NRCS NATIONAL NUTRIENT MANAGEMENT STANDARD 590, APRIL 1999
2. (OHIO, MICHIGAN, INDIANA) TRI-STATE FERTILITY GUIDE, EXTENSION BULLETIN E-2567, JULY 1995
3. WATERBORNE PATHOGENS IN AGRICULTURAL WATERSHEDS, USDA-NRCS WATERSHED INSTITUTE , JUNE 2000
4. DISPELLING COMMON MYTHS ABOUT PHOSPHORUS IN AGRICULTURE AND THE ENVIRONMENT, TECHNICAL PAPER, USDA-NRCS WATERSHED INSTITUTE
5. AGRICULTURE PHOSPHORUS AND EUTROPHICATION, USDA-ARS-149, JULY 1999
6. NRCS - AGRICULTURAL WASTE MANAGEMENT FIELD HANDBOOK
7. THE OHIO LIVESTOCK WASTE MANAGEMENT GUIDE (OSU BULLETIN 604 – 1992)
8. MIDWEST PLANS SERVICE (MWPS) - 18 SECTION I, 2000 "MANURE CHARACTERISTS"
9. OHIO DEPARTMENT OF AGRICULTURE LIVESTOCK ENVIRONMENTAL PERMITTING PROGRAM

NUTRIENT MANAGEMENT SOFTWARE:

1. Current Purdue Manure Management Planner (MMP) software WWW.AGRY.PURDUE.EDU/MMP
2. Missouri Spatial Nutrient Management Planner (SNMP) software WWW.AGRY.PURDUE.EDU/MMP
3. Current Ohio P Index Spreadsheet
[HTTP://WWW.OH.NRCS.USDA.GOV/FOTG/OHIO_EFOTG.HTM](http://WWW.OH.NRCS.USDA.GOV/FOTG/OHIO_EFOTG.HTM)
4. Current Ohio Farm Nutrient Balance Spreadsheet
[HTTP://WWW.OH.NRCS.USDA.GOV/FOTG/OHIO_EFOTG.HTM](http://WWW.OH.NRCS.USDA.GOV/FOTG/OHIO_EFOTG.HTM)

Tables:

- Table 1. Available Water Capacity (AWC) Practical Interpretations for Soil Moisture for Various Soils Textures and Conditions to Determine Liquid Waste Volume Applications not to exceed AWC.
- Table 2. Application Rates on Idled Cropland with a Growing Cover, Set-Aside or Land in Government Programs.
- Table 3. Procedure to Determine Bray P1 or equivalent Soil Buildup.
- Table 4. Determining The Most Limiting Manure Application Rates
- Table 5. Table 5 – Ohio Department of Agriculture Setbacks

Table 1. Available Water Capacity (AWC) Practical Soil Moisture Interpretations for Various Soils Textures and Conditions to Determine Liquid Waste Volume Applications not to exceed AWC.

This table shall be used to determine the AWC at the time of application and the liquid volume in gallons that can be applied not to exceed the AWC. To determine the AWC in the upper 8 inches use a soil probe or similar device to evaluate the soil to a depth of 8 inches.

Available Moisture in the Soil	Sands and Loamy Sands	Sandy Loam and Fine Sandy Loam	Very Fine Sandy Loam, Loam, Silt Loam, Silty Clay Loam, Clay Loam, Sandy Clay Loam	Sandy Clay, Silty Clay, Clay
< 25% Soil Moisture	Dry, loose and single-grained; flows through fingers.	Dry and loose; flows through fingers.	Powdery dry; in some places slightly crusted but breaks down easily into powder.	Hard, baked and cracked; has loose crumbs on surface in some places.
Amount to Reach AWC	20,000 gallons/ac	27,000 gallons/ac	40,000 gallons/ac	27,000 gallons/ac
25-50% or Less Soil Moisture	Appears to be dry; does not form a ball under pressure.	Appears to be dry; does not form a ball under pressure.	Somewhat crumbly but holds together under pressure.	Somewhat pliable; balls under pressure.
Amount to Reach AWC	15,000 gallons/ac	20,000 gallons/ac	30,000 gallons/ac	20,000 gallons/ac
50 - 75 % Soil Moisture	Appears to be dry; does not form a ball under pressure.	Balls under pressure but seldom holds together.	Forms a ball under pressure; somewhat plastic; slicks slightly under pressure.	Forms a ball; ribbons out between thumb and forefinger.
Amount to Reach AWC	10,000 gallons/ac	13,000 gallons/ac	20,000 gallons/ac	13,000 gallons/ac
75% to Field Capacity	Sticks together slightly; may form a weak ball under pressure.	Forms a weak ball that breaks easily, does not stick.	Forms ball; very pliable; slicks readily if relatively high in clay.	Ribbons out between fingers easily; has a slick feeling.
Amount to Reach AWC	5,000 gallons/ac	7,000 gallons/ac	11,000 gallons/ac	7,000 gallons/ac
100% Field Capacity	On squeezing, no free water appears on soil, but wet outline of ball on hand.	On squeezing, no free water appears on soil, but wet outline of ball on hand.	On squeezing, no free water appears on soil, but wet outline of ball on hand.	On squeezing, no free water appears on soil, but wet outline of ball on hand.
Above Field Capacity	Free water appears when soil is bounced in hand.	Free water is released with kneading.	Free water can be squeezed out.	Puddles: free water forms on surface

Table 2. APPLICATION RATES ON IDLED CROPLAND WITH A GROWING COVER, SET-ASIDE OR LAND IN GOVERNMENT PROGRAMS.

The following criteria shall be followed if land users desire to apply wastes on idled cropland with a growing cover, set aside or on land in government programs (CRP, WRP, Other Government Easement Type Land).

1. Use the original soil test that was used to make the fertilizer determinations when the land went under set aside or obtain a new soil test if one is not available.
2. Obtain an analysis of the wastes before application to determine nutrient content.
3. Wastes may be applied up to the rates specified below based on the waste analysis and the soil test values for Bray P1 or equivalent.
4. FOR IDLED CROPLAND WITH A GROWING COVER, SET ASIDE LAND (CRP, ETC) WITH SOIL TEST VALUES LESS THAN A BRAY P1 OF 45 PPM OR EQUIVALENT. Wastes may be applied on an ANNUAL BASIS not to exceed the most limiting of the N or P rates specified below:

	Phosphorus (P)	Nitrogen (N)
Bray P1 or equivalent Value Or Equivalent	Annual Application Rate (Lbs/Ac of P2O5) (Maximum of 10 years of Application)	Based on Available N at the Time of Application
< 5 ppm	105	125
5-10 ppm	90	125
10-15 ppm	80	125
15-20 ppm	70	125
20-25 ppm	55	125
25-45 ppm	50	125

5. FOR IDLED CROPLAND WITH A GROWING COVER, SET ASIDE LAND (CRP, ETC) WITH SOIL TEST VALUES BETWEEN 45 PPM AND 150 PPM BRAY P1 OR EQUIVALENT. Limit waste application to the most limiting of 50 Lbs/Ac of P2O5 or 125 Lbs/Ac of available N once during a 10 year period.
6. FOR IDLED CROPLAND WITH A GROWING COVER, SET ASIDE LAND (CRP, ETC) WITH SOIL TEST VALUES MORE THAN 150 PPM OR EQUIVALENT. No application of wastes.

Table 3. Procedure to Calculate the Bray P1 or equivalent Soil Buildup.

This procedure is to be used to estimate the number of years for a field to reach a Bray P1 or equivalent of 150 ppm when more P is being added than the crops can utilize.

Step 1. Determine how many Lbs/Ac of P2O5 is added per year.

Add together all the P2O5 added from manure/biosolids and from commercial fertilizer sources.

Crop (List the crops in the rotation)	P2O5 Lbs/Ac From Manure/Biosolids	P2O5 Lbs/Ac From Commercial Fertilizer	Total for the Crop Year (Manure/Biosolids + Commercial)
1.			
2.			
3.			
4.			
5.			
Totals			

Average Lbs/Ac of P2O5 applied per year = Total Divided by Years = _____ Lbs/Ac/Yr

Step 2. Determine the Average Lbs/Ac of P2O5 removed each year.

Refer to the Nutrient Management Standard, Agronomy Guide, or Tri-State Fertility Guide to determine crop removal rates for each crop and year. Add all the excess rates for each year and divide by the number of years in the rotation. This will equal the "Average P2O5 Crop Excess Per Year".

Crops in Rotation	P2O5 Added	P2O5 Removed	P2O5 Balance (Excess)
1.			
2.			
3.			
4.			
5.			
Totals			

The Total Excess divided by the number of Years = _____ Lbs/AC P2O5 Buildup /Year (Excess)

Step 3. Determine the Estimated Bray P1 or equivalent (in PPM) Buildup Per Year.

Divide the Lbs/Ac Buildup (from Step 2) by 20 = Bray P1 or equivalent Buildup in PPM/Ac/Yr

Step 4. Determine How Many Years to Reach Bray P1 or equivalent of 150 PPM

Step 4a. 150 PPM Bray P1 or equivalent (minus) Present Bray P1 or equivalent (ppm) = ppm available to reach 150 ppm.

Step 4b. Divide Available ppm to reach 150 ppm (Step 4a) by (Step 3) = Years to Reach 150 PPM

Step 5. Repeat for the necessary fields.

Table 4. Determining The Most Limiting Manure Application Rates

Field Situation & Time of Year	Limiting Application Rate Criteria				
	Nitrogen	P2O5 ^{4/}	K2O	Tons/Ac Gallons/Ac	AWC Table
(April - June) Subsurface Drained or High N Leaching Potential	1/ Crop Needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	13,000 gal.	Upper 8"
(April - June) Pasture > 20% or Cropland > 15% Subsided Drained or High N Leaching Potential	Crop Needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	5/ 10 wet tons 5,000 gal. - unless contoured strips or incorporated immediately	Upper 8"
(July - Sept.) No Growing Crop Subsurface Drained or High N Leaching Potential	2/ 50 lbs/ac as applied N	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	13,000 gal.	Upper 8"
(July - Sept.) With a Growing Cover Crop Subsurface Drained or High N Leaching Potential	3/ Next year's crop needs as applied N	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	13,000 gal.	Upper 8"
(July - Sept.) No Growing Crop Cropland > 15% Subsided Drained or High N Leaching Potential	2/ 50 lbs/ac as applied N	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	5/ 10 wet tons or, 13,000 gal.	Upper 8"
(Oct. - March) Subsurface Drained or High N Leaching Potential	3/ Next year's crop needs as applied N	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	13,000 gal.	Upper 8"
(Oct. - March) Pasture > 20% or Cropland > 15% Subsided Drained or High N Leaching Potential	3/ Next year's crop needs as applied N	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	5/ 10 wet tons 5,000 gal. - unless contoured strips or incorporated immediately	Upper 8"
Frozen or Snow Cover Subsurface Drained or High N Leaching Potential	3/ Next year's crop needs as applied N	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	5/ 10 wet tons < 50% Solids; 5 wet tons > 50% solids; Liquid Manure 5000 gallons/acre	

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Conservation practice standards are reviewed and updated periodically. To obtain a current version of this standard contact the Natural Resources Conservation Service office or web site (www.oh.nrcs.usda.gov).

**Section IV, FOTG
Standard 633
June 2003**

Field Situation & Time of Year	Limiting Application Rate Criteria				
	Nitrogen	P2O5 ^{4/}	K2O	Tons/Ac Gallons/Ac	AWC Table
(April - June) Not Subsurface Drained	1/ Crop Needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac		Upper 8"
(July - Sept.) Not Subsurface Drained	1/ Crop Needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac		Upper 8"
(Oct. - March) Not Subsurface Drained	1/ Crop Needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac		Upper 8"
(April - June) Not Subsurfaced Drained Pasture > 20% or Cropland > 15%	1/ Crop Needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	5/ 10 wet tons 5,000 gal. - unless contoured strips or incorporate immediately	Upper 8"
(July - Sept.) Not Subsurfaced Drained Pasture > 20% or Cropland > 15%	1/ Crop Needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac		Upper 8"
Frozen or Snow Cover Not Subsurface Drained	1/ Next year's crop needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	5/ 10 wet tons < 50% Solids; 5 wet tons > 50% solids; Liquid Manure 5000 gallons/acre	
(Oct. - March) Not Subsurfaced Drained Pasture > 20% or Cropland > 15%	1/ Crop Needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	5/ 10 wet tons 5,000 gal. - unless contoured strips or incorporate immediately	Upper 8"
1/ Crop Needs factoring N losses - Maximum total nitrogen applied to meet the succeeding crop's recommended NITROGEN requirements for non-legume crops or 150 lbs/ac NITROGEN for the succeeding legume crop. Considers loss of N through application method and time of year.					
2/ 50 lbs/ac as applied N - Nitrogen application limited to 50 lbs/ac based on the addition of the NH ₄ or NH ₃ (ammonium/ammonia) content of the manure + 1/3 of the organic nitrogen content the manure as applied. Considers no losses due to application method or time of year.					
3/ Next year's crop needs as applied N - Maximum total nitrogen applied to meet the succeeding crop's recommended NITROGEN requirements for non-legume crops or 150 lbs/ac NITROGEN for the succeeding legume crop. Considers no losses due to application method or time of year.					
4/ Under special conditions and criteria the rate of P2O5 application can be increased to 500 lbs./acre see (Nutrient Management Standard 590).					
5/ Wet tons refers to the weight of the manure as it is applied – include solids and moisture weight.					

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Appendix A Table 1 of rule 901:10-1-14: Land Application Restrictions and Setbacks

ODA (Permitted Operations) Land Application Restrictions

	1	2	3	4
	Stockpiles	Surface Application	Winter Applications Frozen or Snow Covered Ground (1)	Surface Incorporation w/ 24 Hours OR Direct Injection
Class V wells, sinkholes	300'	300'	300'	100'
Perennial Streams	300'	35' veg cover, 100' (2)	35' veg. cover, 100' (2)	35' veg. cover
Seasonal salmonid and cold water habitat:	300'	35' veg.cover or 100'(2)	35' veg. cover, 100' (2)	35' veg. Cover
Intermittent Stream / Ditch or Surface Inlet	300'	35' veg.cover or 100'(2)	35' veg. cover, 100' (2)	None
Drainageways, grassed waterways	300'	35'	100'	None
Pond or Lake	300'	35'	100'	35'
Private or Public Well	300'	300'	300'	100'
Public Surface Drinking Water Intake	1500'	300'	300'	300'
Springs	300'	300'	300'	100'
Neighboring residences:	500'	300'	300'	100'
Flooding/flood plains/floodways (3):	do not stockpile	do not apply	do not apply	permissible
Slope (4):	0-6%	>15% see note 5	If > 6% see note 6	>15% see note 5
Maximum Application Rate:	Liquid Manure - Based on Appendix B (AWC Chart) & Appendix F (Most Limiting Nutrient Chart) Solid Manure - Based on Appendix F (Most Limiting Nutrient Chart)			
<p>Note (1): For surface applications without snow there must be > 80% ground and/or canopy cover. For snow or ice covered fields, only 10% or 2 acres, whichever is greater can be used for application. All winter surface applications must have prior approval from the Ohio Department Of Agriculture.</p> <p>Note (2): The first setback refers to a vegetative cover setback that must be maintained while the second refers to the total setback distance. Permanent vegetation consisting of grass, grass/legume mix, trees/shrubs, or trees/shrubs and grass/legumes, measured from top of bank. Can use a 35' non vegetative buffer for intermittent stream / ditches or surface inlets if the manure application area has at least 50% vegetation/residue cover at the time of application.</p> <p>Note (3): No applications during expected flooding season as reported in Appendix A, Table 2</p> <p>Note (4): Must have < 5 ton/ac yearly average soil loss to perform surface manure applications</p> <p>Note (5): Manures are not to be applied to cropland over 15% slope or to pastures/hayland over 20% slope unless <u>ONE</u> of the following precautions are taken: a. Immediate incorporation or injection with operations done on the contour, UNLESS the field has 80% ground cover (residue or canopy). b. Applications are timed during periods of lower runoff and/or rainfall (May 20th - October 15th) c. Split applications are made (separated by rainfall events) with single applications not exceeding 10 wet tons/ac or 5000 gal/ac. d. The field is established and managed in contour strips with alternated strips in grass or legume.</p> <p>Note (6): Manure are not to be applied in the winter to fields with over 6% slope unless one of the following precautions are taken: a. The field is established in grass or legume with 90% cover, or the fields has 90% or more residue cover, or the land is managed in contour strips. b. The fields has 90% or more residue cover. c. Contour strips are used with alternate strips in grass or legume and manure is applied on alternate strips only.</p>				
Source: USDA-NRCS (2003). Field Office Technical Guide-Conservation Practice Standard, 633, Columbus, Ohio.				

Practice Documentation For: <i>Waste Utilization - 633</i>
The following documentation must be in the case folder or engineering subfolder.
Practice Planning
1. Is the practice part of a conservation plan? 2. Have the purpose(s) for the practice been identified? 3. Is the location of the practice(s) identified on a map or plan drawing?
Practice Design
Have the following design criteria been addressed? (Same as Nutrient Management - 590)
Practice Installation / Application
Does the practice meet the minimum criteria for the planned purpose(s)? Have the following criteria been documented in the assistance notes or practice jobsheet? (Same as Nutrient Management - 590)
Practice Deficiencies
If applicable, have the practice deficiencies been communicated with the decisionmaker?
Practice Maintenance
Have the following maintenance actions been communicated to the decisionmaker? (Same as Nutrient Management - 590)
Other Comments: